doubtless be unfair to say of the author that, so far as his treatment of Darwin is concerned—

"Willing to wound, and yet afraid to strike,"

he would

"Just hint a fault, and hesitate dislike;
    Damn with faint praise, assent with civil leer,
    And without sneering, teach the rest to sneer "—

but we cannot acquit him of a somewhat captious method of dealing with Darwin's clear and well considered utterances. We have seen of late a great deal of groundless objection to the Darwinian position, and many quite uncalled-for attempts to minimise the value of the Darwinian contribution to evolutionary theory. We may freely concede that the opinion expressed in the " Origin of Species " in favour of the transmission of acquired characters has not stood the test of investigation; but this is a negligible matter in comparison with the enormous impulse to evolutionary theory given by the doctrine of selection, which doctrine it was the peculiar merit of Darwin and Wallace to have presented in such a form as to command the attention of all scientific workers, and the assent of most. It cannot be said that the various attempts to dispense with selection have met with success, and in spite of the " carpers carping with their carps," we think that the Darwinian treatment of variation and selection still affords the only basis for a reasonable account not only of adaptation, but also of the origin of species.   F. A. D.

THE FAUNA AND FLORA OF ALASKA.

Harriman Alaska Expedition. Edited by Dr. C. H. Merriam. Vol. v. Cryptogamic Botany (pp. ix + 424). Vols. viii. (pp. ix + 238) and ix. (pp. 284). Insects. Vol. x. Crustaceans (pp. 337); illustrated. (New York : Doubleday, Page and Co., 1904.)

FROM time to time brief notices have appeared in our columns of various issues of " Papers from the Harriman Alaska Expedition," published in the *Proceedings* of the Washington Academy of Sciences. The whole of these papers, together with others hitherto unpublished, are now in course of re-issue in the form of a series of handsome and well illustrated volumes, with the title cited above, and under the editorship of Dr. C. Hart Merriam, the well known chief of the Biological Survey of North America. As the various papers are reprinted from the original electrotypes, and the original pagination is given in brackets, there is no likelihood of any confusion arising by quoting from the re-issue. Of these volumes, four are now before us.

Before going further, it may be well to state that the work does not attempt to give a complete account of the fauna and flora of the Alaskan peninsula. In the insect volumes, for example, many of the papers deal only with the material brought back by the expedition, although in a few instances the existing state of our knowledge of each group is given so far as Alaska is concerned. Even where no attempt is made to formulate complete lists, in many cases the material obtained was, however, so extensive as to include the greater part of the representatives of the group de-

scribed. In every instance the description and identification of the specimens collected have been assigned to specialists.

The volume on cryptogamic botany contains not only the new information acquired as the result of the expedition, but an account of the previous state of knowledge of the subject. Special interest attaches to the general account of Alaskan vegetation given in the introduction. The southern districts of Alaska, it appears, are characterised by the grandeur of their forests and the brilliancy of the flowers beyond the forest tract, the usual alpine conditions prevailing above the timber belt. Closer examination even of the wooded area reveals, however, a wealth of flowerless vegetation which gives to the flora a character it would otherwise lack; while the flowers of the mountain tops and prairies are set in beds of moss and fern. In the forest, owing to the abundant rainfall, every mouldering log, as well as the standing stems, are clothed with moss, which carpets the ground, and hangs in festoons from the branches. Among the mosses and liverworts grow many of the more delicate flowering plants, while the many fleshy funguses make this carpet their special home. The open glades are occupied by peat-mosses (Sphagnum) in considerable variety, which afford a basis for cranberries, sundews, and butterworts. North of the forest zone appears a wet, boggy tract, passing into the frozen Arctic tundra, the mossy carpet of which is, however, spangled in summer with a perfect blaze of flowers. In these open areas ferns grow in great luxuriance, and on Kadiak Island the traveller may wade through beds of bady-fern nearly waist-deep.

No less than eight specialists have given their services to the determination and description of the cryptogams collected during the expedition.

Passing to the volumes on insects, we have to note, in the first place, that this department in the expedition was confided to Prof. Kincaid, of Washington University, who collected some 8000 specimens, representing about 1000 species, and, secondly, that under the general title of insects are included both myriapods and arachnids. In the first of the two volumes, special value attaches to the paper on myriapods by Mr. O. F. Cook, since it treats of all the known members of that little-worked group hitherto obtained from north-western North America. Previous to the Harriman Expedition, our knowledge of the Alaskan insect fauna was mainly restricted to the Coleoptera and Lepidoptera, and consequently special efforts were made to collect the other groups. The result has shown that Alaska possesses a rich entomological fauna which awaits other collectors to reveal fully. Out of the 1000 species collected, 344 have been regarded as new to science. Special attention was devoted to the study of the adaptation of Alaskan insects to their surroundings, more particularly in the Sitka district, where the annual rainfall attains the enormous total (for a non-tropical or subtropical zone) of 105 inches. As might have been expected, the Diptera were found to form the predominating element in the insect fauna, but of this group only a small percentage has hitherto been, in all probability,

collected. In addition to those on myriapods and arachnids, the first of the insect volumes includes papers on Alaskan Coleoptera, Lepidoptera, Neuroptera, Orthoptera, Homoptera, and various minor groups. Special interest attaches to the chapter by Prof. Kincaid on the metamorphoses of Alaskan Coleoptera, in the course of which the author points out that the prevalent idea as to 'the extreme difficulty of rearing adult beetles from their larval condition is to a great extent founded on error.

The second of the two volumes on insects (ix.) is devoted to the Diptera and Hymenoptera, the article on the former being written by Mr. W. Coquillett, and the one on the latter group by Mr. W. H. Ashmead. In addition to these are three minor papers on certain sections of the aforesaid groups. A sample of the excellent results of Prof. Kincaid's energetic collecting is afforded by the case of the Hymenoptera, in which group less than thirty species were known from Alaska previous to the expedition, while the number now recorded is no less than 335, 201 of these being regarded as new to science. Of Diptera, 2423 specimens, representing 276 species, were collected, out of which one genus and 63 species are described as new.

As regards the volume on crustaceans, the great bulk of this is occupied by Miss Rathbun's elaborate and exhaustive memoir on the decapod section, Miss Richardson contributing a short account of the isopods, while Messrs. Holmes and Cole are severally responsible for the amphipods and pycnogonids, or sea-spiders. Miss Rathbun has treated her portion of this extensive subject from a very broad standpoint, discussing the crabs and shrimps not only of the Alaskan seas, but of the western coast of America generally, from the Arctic Circle to southern California. The decapod fauna of the North Pacific has proved very rich in individuals, if not in species. Among the more abundant types are the hermit-crabs, of which many species have local centres of distribution, where they attain their maximum development, both as regards size and numbers. In certain localities this crowding of crustacean life has been specially favourable to the development of parasitism. The decapods form the staple food of many kinds of fishes, and certain species are commonly used by fishermen as bait, or caught for the table. In many cases the northern limits of the species are determined by the winter line of floating ice in Bering Sea.

As regards the other groups, it must suffice to say that while Mr. Holmes restricts himself to the amphipods collected during the expedition, the isopods and pycnogonids of the whole western coast, from Alaska to California, are discussed. It is perhaps this variation in the mode in which the different groups are treated that constitutes the main ground for criticism in regard to the general plan of this magnificent and valuable work. Both editor and contributors are to be congratulated upon the results of their labours, so far as these are at present before the public, while the thanks of the scientific world are especially due to Mr. Harriman, as the generous provider of the means whereby this important addition to knowledge has been rendered possible. 　　　　　R. L.

THE THEORY OF DETERMINANTS.

The Theory of Determinants. By R. F. Scott, M.A. Second edition. Revised by G. B. Mathews, M.A., F.R.S. Pp. xi+288. (Cambridge: University Press, 1904.) Price 9s. net.

THIS well known treatise has been revised and enlarged in several respects. For instance (chapter xi.), the theory of linear equations is more complete than in the first edition, and Bezout's method of elimination is explained, as well as Sylvester's.

An introductory chapter has been inserted, containing an elementary account of three-rowed determinants; this should prove a considerable help to beginners. As a whole, the new edition is probably easier reading than the first; but even now the style seems rather too condensed for the average reader, and illustrations of general theorems by special cases are somewhat scarce.

A chapter (x.) on infinite determinants has been added; this appears to be based on the work of von Koch and Cazzaniga, but as some investigations have been abbreviated, occasional difficulties may be encountered at a first reading. Thus von Koch's proof that a normal determinant converges (art. 5) would be clearer if reproduced in full, and the convergence-test employed here [1] might be explained at greater length. The investigations of arts. 6 and 10 assume that certain infinite sequences (a_{ik} and C_{ik}) have upper limits; von Koch establishes this property by comparison with infinite products.

Semi-normal determinants are defined, in art. 11, after Cazzaniga; von Koch's definition would give a more elegant form to the theory without loss of generality. The two rules for multiplying semi-normals are stated in art. 12; but C is not proved to be equal to AB, and the statement (p. 128) "the series c_{ik} is absolutely convergent" must not be taken to refer to Σc_{ik}. Some examples like Cazzaniga's would emphasise the contrast between these rules and the four rules of art. 10 (for multiplying normal determinants).

On several grounds it is regrettable that chapter x. is not more complete. No proof is given that the value of a normal determinant is the same, wherever the origin may be taken on the principal diagonal; and various analogies with finite determinants are omitted.

A new chapter (vii.) has been inserted, containing the simpler theorems on *Elementartheiler* of determinants; this term is translated literally *elementary divisors,* although several English writers have used *invariant-factors* as the equivalent. The treatment follows Dr. Muth's book very closely; we have explained elsewhere (*Bulletin* Amer. Math. Soc., vol. vii. p. 308) that some changes in Dr. Muth's order might make the work more readable. But, in default of any English text-book, we must welcome this chapter as a useful introduction to the subject.

Frobenius's calculus of bilinear forms is explained

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[1] "A sequence A_n converges if $\lim_{n=\infty} (A_{n+p}-A_n)=0$, for all positive integral values of p." In this test, p *must be free to vary with* n; for instance, if A_n is log n, and p is *fixed*, the limit is zero, although the sequence diverges.